

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029**

Mr. Larry Lawson, Director
Division of Water Program Coordination
Virginia Department of Environmental Quality
629 Main Street
Richmond, VA 23219

Dear Mr. Lawson:

The Environmental Protection Agency (EPA) Region III is approving the Total Maximum Daily Loads (TMDLs) for the aquatic life (benthic) use impairments on Black and Dumps Creek. The TMDLs were submitted to EPA for review in December 2003. The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address an impairment of water quality as identified in Virginia's 1998, Section 303(d) list.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality), (7) consider reasonable assurance that the TMDL can be met, and (8) be subject to public participation. The enclosure to this letter describes how the TMDLs for the aquatic life use impairments satisfy each of these requirements.

Following the approval of these TMDLs, Virginia shall incorporate the TMDLs into the Water Quality Management Plan pursuant to 40 CFR § 130.7(d)(2). As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL WLA pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.



If you have any questions or comments concerning this letter, please don't hesitate to contact Mr. Peter Gold at (215) 814-5236.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure



Decision Rationale

Total Maximum Daily Loads for the Aquatic Life Use Impairments on Black and Dumps Creek

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by a state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document will set forth the Environmental Protection Agency's (EPA) rationale for approving the TMDLs for the aquatic life use (benthic) impairments on Black and Dumps Creek. EPA's rationale is based on the determination that the TMDLs meet the following eight regulatory conditions pursuant to 40 CFR §130.

- 1) The TMDLs are designed to implement applicable water quality standards.
- 2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
- 3) The TMDLs consider the impacts of background pollutant contributions.
- 4) The TMDLs consider critical environmental conditions.
- 5) The TMDLs consider seasonal environmental variations.
- 6) The TMDLs include a margin of safety.
- 7) There is reasonable assurance that the TMDLs can be met.
- 8) The TMDLs have been subject to public participation.

II. Background

The Black and Dumps Creek Watersheds are both located in the coalfields region of southwestern Virginia. Black Creek is located in Wise County and Dumps Creek is in Russell County. The Black Creek Watershed is approximately 2,300 acres in size. The impaired segment is 5.94 miles in length and runs from the Black Creek Lake impoundment to its confluence with the Powell River. The watershed is composed of a variety of landuses including disturbed lands, forests, mine spoils (discarded mine wastes), and benches (abandoned surface mines). Forested lands make-up 25% of the watershed. The remaining portion of the watershed consists of disturbed lands (57%), mine spoils (16%), and benches (2%). The Dumps Creek Watershed is approximately 20,300 acres in size and the impaired segment runs approximately 3.40 miles from the confluence with Hurricane Creek to the mouth of Dumps Creek. Seventy-one percent of the watershed is made up of forested lands with past and present mining operations making up 22% of the watershed. The remaining land is split between industrial development, agriculture, and water.

In response to Section 303(d) of the CWA, the Virginia Department of Environmental

Quality (VADEQ) listed Black (VAS-P17R) and Dumps (VAS-P08R) Creek on Virginia's 1998 Section 303(d) list as being unable to attain the general standard for the aquatic life use. The failure to attain the general standard for the aquatic life use was determined through biological assessments of the benthic macroinvertebrate community. This decision rationale will address the TMDLs for the impairment of the aquatic life use.

Virginia's 305(b)/303(d) guidance states that support of the aquatic life beneficial use is determined by the assessment of conventional pollutants (dissolved oxygen, pH, and temperature); toxic pollutants in the water column, fish tissue, and sediments; and biological evaluation of benthic community data.¹ Therefore, a biological assessment of the benthic community can be used to determine a stream's compliance with the state's general standard for the aquatic life use. Virginia uses EPA's Rapid Bioassessment Protocol (RBPII) to determine status of a stream's benthic macroinvertebrate community.² This approach evaluates the benthic macroinvertebrate community between a monitoring site and its reference station. Measurements of the benthic community, called metrics, are used to identify differences between monitored and reference stations.³ Please note that the state is currently in the process of changing this methodology to a stream condition index approach.

As part of the RBPII approach, reference stations are established on streams which are minimally impacted by humans and have a healthy benthic community. These reference stations represent the desired community for the monitored sites. Monitored sites are evaluated as non-impaired, slightly impaired, moderately impaired, or severely impaired based on a comparison of the biological communities of the reference and monitored sites. Streams that are classified as moderately (after a confirmatory assessment) or severely impaired after an RBPII evaluation are classified as impaired and are placed on the Section 303(d) list of impaired waters. During the 1998 assessment period, Black and Dumps Creek were identified as being severely and moderately impaired respectively.

The RBPII analysis assesses the health of the macroinvertebrate community of a stream. The analysis will inform the biologist if the stream's benthic community is impaired. However, it will not inform the biologist as to what is causing the degradation of the benthic community. Both streams were listed in 1998 as being impacted by acid mine drainage, however, a specific pollutant source was not identified. Additional analysis was required to determine the pollutants which were causing the impairment. TMDL development requires the identification of impairment causes and the establishment of numeric endpoints that will allow for the attainment of designated uses and water quality criteria.⁴ For these TMDLs a statistical approach was used

¹VADEQ. 1997. 1998 Water Quality Assessment Guidance for 305(b) Water Quality Report and 303(d) TMDL Priority List Report. Richmond, VA.

²Tetra Tech 2002. Total Maximum Daily Load (TMDL) Development for Blacks Run and Cooks Creek. Fairfax, Virginia.

³Ibid 2

⁴Ibid 2

as the basis for the determination of the pollutants of concern.

A multiparameter statistical analysis was conducted to determine the primary stressors and their mathematical relationship.⁵ Eleven stressors were identified and evaluated as potentially impacting the benthic community. The mathematical relationship allowed for the allocations to be applied to the stressors while maintaining the aquatic life measures as the endpoint.⁶ The statistical model developed a simulated reference or nonimpaired condition. Seven biometric models were developed representing the metrics used in the RBPII assessment. These metrics include taxa richness, Ephemeroptera Plecoptera Trichoptera (EPT) to chironomid ratio, EPT index parameter estimates, modified family biotic index, shredder to total ratio, scrapper to filtering collector ratio, percent contribution from dominant family. The seven biometric models were developed using mathematical relationships of the eleven stressors.

The TMDL was modeled to meet an elevated non-impaired biological condition. The Hydrologic Simulation Program Fortran (HSPF) was used to quantify the pollutant loadings to the stream. The loadings obtained from the HSPF model were planted into the biometric models, to determine the impacts of the loadings. To develop the RBPII endpoint for a non-impaired stream all of the reference stations within the Virginia coalfields were evaluated. A total of 61 records were identified in the VADEQ database, representing 35 reference stations.⁷ The records were ordered from one to 61 and sequentially one record was chosen as the reference station to evaluate the remaining 60 records.⁸ The average bioassessment scores for these reference stations was 85 percent, a non-impaired status.⁹ This value (85 percent) was used as the endpoint for these TMDLs and is in excess of the score (79 percent) typically used to determine attainment.

For land based sources, the HSPF model accounts for the buildup and washoff of pollutants from these areas. Buildup (accumulation) refers to all of the complex spectrum of dry-weather processes that deposit or remove pollutants between storms.¹⁰ Washoff is the removal of wastes which occurs as a result of runoff associated with storm events. These two processes allow the HSPF model to determine the amount of pollutants from land based sources which are reaching the stream. Point sources with loads not requiring stormwater for delivery to the streams were treated as discharging directly to the streams. Other point sources collected

⁵MapTech 2004. General Standard Total Maximum Daily Load Development for Dumps Creek Russell County, Virginia. Blacksburg, VA.

⁶Ibid 5.

⁷Ibid 5

⁸Ibid 5

⁹Ibid 5

¹⁰CH2MHILL, 2000. Fecal Coliform TMDL Development for Cedar, Hall, Byers, and Hutton Creeks Virginia,

stormwater and discharged only when their surface impoundments' capacity were exceeded. These facilities were modeled similarly to nonpoint sources.

The Black Creek TMDL called for an 80 percent reduction in manganese from non remaining point sources and a 90 percent reduction from nonpoint sources of manganese. The Black Creek TMDL also calls for a substantial increase in the amount of calcium carbonate to the stream. The regression analysis showed a stronger relationship between alkalinity and benthic assessment scores than pH levels. The increase in alkalinity (calcium carbonate) will work to weaken the acidity of Black Creek and improve the benthic community. Source reductions were required on Dumps Creek as well. A forty and thirty-four percent reduction were required from nonpoint sources of total suspended solids (TSS) and total dissolved solids (TDS).

Table 1 - Summarizes the Specific Elements of the TMDL for Black Creek.

Segment	Parameter	TMDL (kg/yr)	WLA (kg/yr)	LA (kg/yr)	MOS
Black Creek	Manganese	3,726	1,599	2,127	Implicit
	Alkalinity**	842,997	0	842,997	Implicit

** Calcium Carbonate

Table 2 - Summarized the Specific Elements of the TMDL for Dumps Creek

Segment	Parameter	TMDL (kg/yr)	WLA (kg/yr)	LA (kg/yr)	MOS
Dumps Creek	Total Dissolved Solids	5,015,679	1,631,575	3,384,104	Implicit
	Total Suspended Solids	971,583	316,523	655,060	Implicit

The United States Fish and Wildlife Service has been provided with a copy of these TMDLs.

III. Discussion of Regulatory Conditions

EPA finds that Virginia has provided sufficient information to meet all of the eight basic requirements for establishing aquatic life use (benthic) impairment TMDLs for Black and Dumps Creek. EPA is therefore approving these TMDLs. EPA's approval is outlined according to the regulatory requirements listed below.

1) The TMDLs are designed to meet the applicable water quality standards.

The benthic assessment identified that the waters were impaired but failed to identify what was causing the impairment or establish a measurable instream endpoint. An endpoint to define acceptable water quality was established through the used of a water quality model and biometric equations. The endpoint used to determine attainment of the criteria was a nonimpaired biological assessment. A simulated assessment, non-impaired condition was developed through the evaluation of 61 biomonitoring reference stations within the Virginia

coalfields region.

2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

Total Allowable Loads

Virginia indicates that the total allowable loading is the sum of the loads allocated to land based precipitation driven nonpoint source areas (abandoned mine lands, benches, and spoils) and point sources. Activities that increase the levels of sediment to the land surface or their availability to runoff are considered flux sources. The actual value for total loadings for each stream can be found in Tables 1 and 2 of this document.

Waste Load Allocations

There are several National Pollutant Discharge Elimination System (NPDES) permitted facilities discharging to both watersheds. All of the NPDES facilities in the watershed are mining operations and are permitted by the Virginia Department of Mines Minerals and Energy (DMME). Most of the facilities are re-mining operations which work to extract coal from previously mined areas. These operations work to reclaim the land after the extraction of the remaining coal. All of the NPDES permitted facilities were provided with individual waste load allocations (WLAs) even though several of them were not discharging to the stream. Many of the re-mining operations have surface impoundments that collect runoff from the operation and discharge only when this capacity is exceeded. A list of the facilities and their WLAs can be found within the TMDLs and addendums.

Alkalinity was not provided in the WLA, this will be controlled through the permits' pH limits. The TMDL is actually calling for an increase in calcium carbonate (alkalinity) to Black Creek. An acid is any substance that dissolves in water to increase the concentration of H^+ ion. Acids can be characterized by their sour taste and corrosive ability. The extra H^+ ions in water combine with the water molecules

H_2O to form

H_3O^+ . The pH of a water is the measure of its

H_3O^+ concentration, the lower the value the higher the concentration. Acids lose their acidity when they combine with alkalies. Through the increase of alkalinity the acidity of these waters will be decreased. Currently, there is no permitted discharge requirement for alkalinity. Permitted facilities are required to treat their effluent so that their discharge has a pH between 6 and 9.

EPA regulations require that an approvable TMDL include individual WLAs for each point source. According to 40 CFR 122.44(d)(1)(vii)(B), "Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR 130.7." Furthermore, EPA has authority to object to the issuance of any NPDES permit that is inconsistent with the WLAs established for that point source.

Load Allocations

According to Federal regulations at 40 CFR 130.2(g), load allocations (LAs) are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Wherever possible, natural and nonpoint source loads should be distinguished. The load allocation for these TMDLs is a lumped sum loading developed for all nonpoint sources. The TMDLs did not call for a specific loadings from each land use but developed a total loading from all nonpoint sources. Since the watersheds were composed of either forested or previously or currently mined lands (provided with WLAs) and no reductions were expected from forested lands lumping of the total load was deemed appropriate.

Abandoned mine lands were treated in the allocations as nonpoint sources because there are no National Pollutant Discharge Elimination System (NPDES) permits associated with these areas. As such, the discharges associated with these landuses were assigned LAs (as opposed to WLAs). The decision to assign LAs to abandoned mine lands does not reflect any determination by EPA as to whether there are unpermitted point source discharges within these landuses. In addition, by approving these TMDLs with mine drainage discharges treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements.

3) The TMDLs consider the impacts of background pollution.

The TMDL approach inherently considers the impact of background pollutants by considering the loadings from natural sources such as forests.

4) The TMDLs consider critical environmental conditions.

According to EPA's regulation 40 CFR 130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the impaired creeks is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards¹¹. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst-case" scenario condition. For example, stream analysis often uses a low-flow (7Q10) design condition because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum. These TMDLs were developed and run over a

¹¹EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

multi-year period which represented changes in loadings and conditions.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow and loadings as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flows normally occur in early spring from snow melt and spring rain, while seasonally low flows typically occur during the warmer summer and early fall drought periods. Pollutant loadings also change during the year as vegetation grows and less runoff reaches the stream. Consistent with our discussion regarding critical conditions, the TMDL effectively considered seasonal environmental variations through the use of observed weather data over an extended period of time.

6) The TMDLs include a margin of safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL. Virginia used an implicit MOS by allocating the reductions to meet a more pristine biological condition.

7) There is a reasonable assurance that the TMDLs can be met.

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs can be implemented through a number of existing programs such as Section 319 of the CWA, commonly referred to as the Nonpoint Source Program.

The TMDLs in their current form are designed to meet the applicable water quality standards. The Commonwealth to monitor the benefits of the BMPs and determine which practices have the greatest impacts on water quality. It will also provide a mechanism for developing public support and checking the accuracy of the model.

8) The TMDLs have been subject to public participation.

Both TMDLs were subjected to an extensive public participation process. Three public meetings were held for the Black Creek TMDL. The meetings were held on June 05, 2001, October 02, 2001, and April 15, 2002. The first and third meeting were held in the Virginia DMME Big Stone Gap offices. The second meeting was held at the Order of the Eastern Star's Dinsmore Hall in St. Paul, Virginia. All of the meetings were noticed in the Virginia Register and subject to a thirty-day comment period.

There were two public meetings for the Dumps Creek TMDL. The meetings were held on January 29, 2002 and March 25, 2003 at the Order of the Eastern Star's Dinsmore Hall in St. Paul, Virginia and the Cleveland Recreation Facility in Cleveland, Virginia respectively. These meetings were noticed in the Virginia Register and subject to a thirty-day public comment period.